B—32—2019

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

MARCH/APRIL 2019

(CBCS Pattern)

CHEMISTRY

Paper XV

(Physical + Inorganic Chemistry)

(Tuesday, 19-3-2019)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours*   *Maximum Marks*—40

N.B. :—   (*i*)   *All* questions are compulsory.

        (*ii*)   Use of logarithmic table and calculator is allowed.

(Section A) (Physical Chemistry)

1.   Answer any *five* of the following :   5×2=10

   (*i*)   Distinguish between electrolytic cell and galvanic cell.

   (*ii*)   What is the potential of a half-cell consisting of zinc electrode in 0.01 M $ZnSO_4$ solution at 25°C, $E° = -0.76$ V ?

   (*iii*)   Give any *two* statements of third law of thermodynamics.

   (*iv*)   Explain the term chemical potential.

   (*v*)   Derive the relation between enthalpy change (ΔH) and emf of the cell.

   (*vi*)   What are diamagnetic substances ? Give its examples.

   (*vii*)   Define specific susceptibility. Give its unit.

2.   Answer any *two* of the following :   2×5=10

   (*a*)   Give the application of emf measurement in determination of pH by using glass electrode.

   (*b*)   Explain the variation of free energy function with temperature and pressure.

   (*c*)   What are para-magnetic substances ? Explain effect of temperature on it ?

P.T.O.

3. Answer any *one* of the following : 1×7=7

   (*a*) Derive Clausius-Clayperon equation. Give its applications.

   (*b*) What are concentration cells ? Derive the equation for emf of concentration cell without transport.

(Section B) (Inorganic Chemistry)

4. Solve any *three* of the following : 3×3=9

   (*a*) Give any *three* preparations of diborane.

   (*b*) What are boranes ? Calculate the number of electrons present in the framework of Nido B_5H_9 with the help of Wade's rule.

   (*c*) Give the properties of metallocarboranes.

   (*d*) Explain the role of K^+ ion in biological system.

   (*e*) Explain how nitrogenase converts atmospheric nitrogen to ammonia.

5. Solve any *two* of the following : 2×2=4

   (*a*) Explain *three* centre electron pair bond in diborane.

   (*b*) What is STYX No. ? Calculate STYX No. of B_2H_6.

   (*c*) Describe nidocarborane with suitable example.

   (*d*) Explain the role of haemoglobin and myoglobin in transporting oxygen.